

impedance (101, an inductor) or (102, a capacitor) in applicants' invention is to make possible the regulation of the output voltage by changing the phase of the square wave (164) generated by the regulating mosfet bridge (105). That loss free impedance is a fundamental part of applicants' invention, as shown in Figures 1A and 1B.

The purpose of the filter capacitor (16) in the Voigt patent is similar to that of the loss free impedance (12) of the same patent, i.e., preventing the pollution of the AC power source by the switching noise. Applicants do not show such a filter capacitor.

The transformer (52) in the Voigt patent serves several purposes. First, it functions as an energy storage element, storing energy in the primary winding when the blocking oscillator is on and transferring the stored energy to the output windings when the blocking oscillator is off [col. 1, lines 50-55]. Secondly, it includes a sense winding that is used for output voltage regulation [col. 1, lines 60-63]. Thirdly, the transformer provides isolation between the input and output. Fourthly, the transformer acts as a voltage scaling device, changing the input voltage level to the required output voltage level. Fifthly, by adding several output windings, the transformer can be used for generating several outputs. Note that the isolation and voltage scaling functions are common to all transformers and are not discussed in the Voigt patent. Note also that transformer (52) is a light weight ferrite core device, as dictated by the high switching frequency of the blocking oscillator.

The transformer (106) in applicants' invention has some common functionality with the Voigt transformer (52), namely the isolation, voltage scaling, and the possibility to generate a plurality of outputs by multiple output windings. It is, however, fundamentally different from the Voigt transformer in that it does not act as an energy storage element and it does not include a sense winding for output voltage regulation. Unlike the Voigt transformer, in the preferred embodiment applicants' transformer includes a considerable leakage inductance to implement the linear inductor (101). Furthermore, unlike the Voigt transformer, applicants' transformer is typically a mains-frequency device [page 4, line 1].

The electronic device (68) in the Voigt patent is a single power transistor [col. 3, line 44] that is turned on during the energy storage period of the transformer and is turned off during the transfer of the energy from the primary winding to the secondary windings [col. 1, lines 48-55]. That device carries current only in one direction. In contrast the electronic device (103) in applicants' invention carries current in both direction, i.e., it sinks and sources current [page 2, 3rd line in the Summary], it generates a phase-shifted AC voltage at one end of the loss free impedance [page 4, paragraph 3], and it is implemented either as a mosfet bridge, a push-pull circuit, or other functionally similar configurations.

The rectifier (30) in the Voigt patent converts the unregulated AC mains voltage into a DC voltage to feed the self-oscillating converter. There is no such rectifier in applicant's invention, which is aimed at regulating the AC voltage for the load. The purpose of the output capacitors (210, 224, 232, 242, etc.) in the Voigt patent is to filter the output voltages. In applicants' invention a fundamental function of the output capacitor (104) is to serve as an energy storage to enable the regulating bridge to both sink and source current.

Applicants would also like to point out that the power supply described in their application has the inherent capability of both sourcing and sinking currents [page 2, 3rd line in the Summary], which is an important advantage, for example in applications where the load is a DC electric motor. The current sinking capability allows the production of a braking torque for the motor, while returning the excess power to the power source. Voigt's invention has no

possibility to quickly discharge the output capacitors or return any superfluous power to the power source. Instead such power must be dissipated in the circuit.

Comment on the Cited Koenig Patent

Unlike applicants' invention the Koenig patent (5,768,368) is aimed at the distribution and conditioning of low-power telecommunication signals, in particular the ringing voltage. The Koenig patent mentions an unbalanced current source and current sink block (100) [sheet 2], which is essentially the combination of two lossy current regulators and a battery (as shown in Figure 2 of the patent). That block is, however, completely different from the lossless controllable electronic device (103) of applicants' invention, including both its function and implementation.

Conclusion and Request

Applicants proved that the invention cannot be anticipated by the Voigt et al. patent (4,092,709), because that patent discusses a fundamentally different structure, and the elements in that patent have different functions. Thus the rejection of the claims 1-5 and 17 on the basis of that patent is overcome. Accordingly, Applicants submit that all claims of the amended application are now in full condition for allowance, which action Applicants respectfully solicit.

Very respectfully,



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